

CLAIMS

What is claimed is:

1. An energy control apparatus for a vehicle having an internal combustion engine and a battery, comprising:
 - an electric generator adapted to be driven by exhaust gas from said internal combustion engine;
 - said electric generator adapted to be electrically connected to said battery;
 - and
 - means for controlling power output of said electric generator for charging said battery or supplying power to electrical load in said vehicle while said engine is operational.

2. An energy control apparatus for a vehicle having an internal combustion engine and a battery, comprising:
 - a turbocharger adapted to be coupled to said internal combustion engine;
 - an electric generator adapted to be mechanically driven by said turbocharger;
 - said electric generator adapted to be electrically connected to said battery;
 - and
 - means for controlling power output of said electric generator for charging said battery or supplying power to electrical load in said vehicle while said engine is operational.

3. In a vehicle having an internal combustion engine and a battery, the improvement comprising:
 - an electric generator adapted to be driven by exhaust gas from said internal combustion engine;
 - said generator adapted to be electrically connected to said battery; and
 - means for controlling power output of said electric generator for charging said battery or supplying power to electrical load in said vehicle while said engine is operational.

4. In a vehicle having an internal combustion engine and a battery, the improvement comprising:

a turbocharger adapted to be coupled to said internal combustion engine;
an electric generator adapted to be mechanically driven by said turbocharger;
said generator adapted to be electrically connected to said battery; and
means for controlling power output of said electric generator for charging said battery or supplying power to electrical load in said vehicle while said engine is operational.

5. An energy control apparatus for a hybrid electric vehicle having an internal combustion engine, an electric motor, and a battery power supply, comprising:

a turbocharger adapted to be coupled to said internal combustion engine; and
an electric generator adapted to be mechanically coupled to said turbocharger and electrically connected to said battery power supply;
wherein said generator is configured to charge said battery power supply from power provided by said turbocharger.

6. An energy control apparatus as recited in claim 5, further comprising means for controlling power output of said electric generator for charging said battery power supply while said engine is operational.

7. An energy control apparatus as recited in claim 5, wherein said generator is adapted to be electrically connected to said motor and configured to supply at least partial power to said motor from power provided by said turbocharger.

8. An energy control apparatus as recited in claim 5, wherein said turbocharger has a controlled constant or variable outlet pressure for altitude compensation, for controlling power output, or for both altitude compensation and controlling power output.

9. An energy control apparatus for a hybrid electric vehicle having an internal combustion engine, an electric motor, and a battery power supply, comprising:

 a turbocharger adapted to be coupled to said internal combustion engine; and
 an electric generator adapted to be mechanically coupled to said turbocharger and electrically connected to said battery power supply;

 wherein said generator is configured to charge said battery power supply from power provided by said turbocharger.

10. An energy control apparatus as recited in claim 9, further comprising means for controlling power output of said electric generator for charging said battery power supply while said engine is operational.

11. An energy control apparatus as recited in claim 9, wherein said turbocharger has a controlled constant or variable outlet pressure for altitude compensation, for controlling power output, or for both altitude compensation and controlling power output.

12. An energy control apparatus as recited in claim 9, wherein said generator is adapted to be electrically connected to said motor and configured to supply at least partial power to said motor from power provided by said turbocharger.

13. An energy control apparatus for a hybrid electric vehicle having an internal combustion engine, an electric motor, and a battery power supply, comprising:

 a turbocharger adapted to be coupled to said internal combustion engine; and
 an electric generator adapted to be mechanically coupled to said turbocharger and electrically connected to said motor and to said battery power supply; wherein said generator is configured to charge said battery power supply from power provided by said turbocharger; and

 wherein said generator is configured to supply at least partial power to said

motor from power provided by said turbocharger.

14. An energy control apparatus as recited in claim 13, further comprising means for controlling power output of said electric generator for charging said battery power supply while said engine is operational.

15. An energy control apparatus as recited in claim 13, wherein said turbocharger has a controlled constant or variable outlet pressure for altitude compensation, for controlling power output, or for both altitude compensation and controlling power output.

16. In a hybrid electric vehicle having an internal combustion engine, an electric motor and a battery power supply, the improvement comprising:

a turbocharger coupled to said internal combustion engine; and
an electric generator mechanically coupled to said turbocharger and electrically connected to said battery power supply;
wherein said generator is configured to charge said battery power supply from power provided by said turbocharger.

17. An improvement as recited in claim 16, wherein said generator is electrically connected to said motor and configured to supply at least partial power to said motor from power provided by the said turbocharger.

18. An improvement as recited in claim 16, further comprising means for controlling power output of said electric generator for charging said battery power supply while said engine is operational.

19. An improvement as recited in claim 16, wherein said turbocharger has a controlled constant or variable outlet pressure for altitude compensation, for controlling power output, or for both altitude compensation and controlling power output.

20. In a hybrid electric vehicle comprising an internal combustion engine, an electric motor and a battery power supply, the improvement comprising:
a turbocharger coupled to said internal combustion engine; and
means for charging said battery power supply from power provided by said turbocharger.

21. An improvement as recited in claim 20, wherein said means comprises an electric generator mechanically coupled to said turbocharger and electrically connected to said battery power supply.

22. An improvement as recited in claim 20, wherein said generator is electrically connected to said motor and configured to supply at least partial power to said motor from power provided by said turbocharger.

23. An improvement as recited in claim 21, further comprising means for controlling power output of said electric generator for charging said battery power supply while said engine is operational.

25. An improvement as recited in claim 21, wherein said turbocharger has controlled constant or variable outlet pressure for altitude compensation, for controlling power output, or for both altitude compensation and controlling power output.

26. A hybrid electric vehicle, comprising:
an internal combustion engine;
an electric motor;
a battery power supply coupled to said electric motor;
a drivetrain configured to be coupled to said engine and said motor;
a turbocharger coupled to said internal combustion engine; and
means for charging said battery power supply from power provided by said turbocharger.

27. A hybrid electric vehicle as recited in claim 26, wherein said means comprises an electric generator mechanically coupled to said turbocharger and to said battery power supply.

28. A hybrid electric vehicle as recited in claim 26, wherein said generator is electrically connected to said motor and configured to supply at least partial power to said motor from power provided by said turbocharger.

29. A hybrid electric vehicle as recited in claim 26, further comprising means for controlling power output of said generator for charging said battery power supply while said engine is operational.

30. A hybrid electric vehicle as recited in claim 26, wherein said turbocharger has a controlled constant or variable outlet pressure for altitude compensation, for controlling power output, or for both altitude compensation and controlling power output.

31. A hybrid electric vehicle, comprising:
an internal combustion engine;
an electric motor;
a battery power supply coupled to said electric motor;
a drivetrain configured to be coupled to said engine and said motor;
a turbocharger coupled to said internal combustion engine; and
an electric generator mechanically coupled to said turbocharger and electrically connected to said battery power supply;
wherein said generator is configured to charge said battery power supply from power provided by said turbocharger.

32. A hybrid electric vehicle as recited in claim 31, further comprising means for controlling power output of said electric generator for charging said battery power supply while said engine is operational.

33. A hybrid electric vehicle as recited in claim 31, wherein said generator is electrically connected to said motor and configured to supply at least partial power to said motor from power provided by said turbocharger.

34. A hybrid electric vehicle as recited in claim 31, wherein said turbocharger has a controlled constant or variable outlet pressure for altitude compensation, for controlling power output, or for both altitude compensation and controlling power output.

35. A hybrid electric vehicle, comprising:
an internal combustion engine;
an electric motor;
a battery power supply coupled to said electric motor;
a drivetrain configured to be coupled to said engine and said motor;
a turbocharger coupled to said internal combustion engine; and
an electric generator mechanically coupled to said turbocharger and electrically connected to said motor and to said battery power supply;
wherein said generator is configured to charge said battery power supply from power provided by said turbocharger; and
wherein said generator is configured to supply at least partial power to said motor from power provided by said turbocharger.

36. A hybrid electric vehicle as recited in claim 35, wherein said turbocharger has a controlled constant or variable outlet pressure for altitude compensation, for controlling power output, or for both altitude compensation and controlling power output.

37. A hybrid electric vehicle as recited in claim 35, further comprising means for controlling power output of said generator for charging said battery power supply while said engine is operation.

38. A power control method for a hybrid electric vehicle having an internal combustion engine, an electric motor, and a battery power supply, comprising:

- coupling a turbocharger to said internal combustion engine;
- coupling an electric generator to said turbocharger and to said battery power supply;
- using said turbocharger to compensate for power loss in said internal combustion engine; and
- charging said battery power supply from power provided by said turbocharger.

39. A method as recited in claim 38, further comprising powering said motor from said generator.

40. A power control method for a hybrid electric vehicle having an internal combustion engine, an electric motor, and a battery power supply, comprising:

- using a turbocharger to compensate for power loss in said internal combustion engine; and
- using power from said turbocharger to drive a generator configured for charging said battery power supply.

41. A method as recited in claim 40, further comprising powering said motor from said generator.